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SOURCE Radio, No 10, 1950, pp 31-34

THE BELARUS' RADIO RECEIVER

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General Description

The Belarus radio receiver is a 13-tube, first-class, ac superheterodyne receiver; it covers six bands, including one long-wave, one medium-wave, and four short-wave bands (55.3-31.3 m, spread 31 m, spread 25 m, and spread 10 m). The i-f is 466 kc. Figure 1, the circuit diagram, is appended. For Figures 2, 3 and 4, i. e., views of front of cabinet, arrangement of push buttons and chassis, see pages 32-34 of original document in FDD.

For each short-wave band, the antenna is inductively coupled to a different tuned circuit in the input circuit of the rf amplifier.

To reduce cross modulation on long and medium waves, the signal passes from the receiver input through band filters, then is amplified by the rf amplification stage, and goes to the grid of the 63A7 converter tube.

A pentode-connected 6F6 in a Hartley circuit with cathode coupling serves as an oscillator.

The first i-f band filter is located in the plate circuit of the 63A7, with continuously adjustable coupling between circuits. The two-stage i-f amplifier uses 6K7 tubes. The second i-f band filter permits only a discrete change in band width. The first and second i-f filters are mechanically ganged.

The first 637(L5) operates as a detector and the first of amplifier. The 6G7(L6), both triodes of which are connected in parallel, functions as preamplifier. The latter is transformer-coupled with the output tubes.



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The output stage has two 6P3's connected in push-pull. The undistorted output power, taken from the output stage, considerably exceeds the rated power (4w).

A negative feed-back voltage is supplied from the secondary winding of the output transformer through corrective elements C_{63} , R_{34} , R_{30} , C_{65} , and R_{29} to the grid circuit of tube 6H7. Amplification of the low audio frequencies is adjusted by means of potentiometer R_{30} . Switch S_8 , which shorts out capacitors C_{57} - C_{96} , regulates the high audio frequencies.

The 6E5 tube is the optical tuning indicator.

Amplified AVC is used in the receiver. The voltage of the rf-modulated signal is supplied from the L_{35} , C_{45} circuit through capacitor C_{44} to the diode part of the second 6G7 tube (L_{11}).

The dc component of the rectified voltage, which depends on the signal amplitude, is taken from resistor R_{33} and applied to the control grid of the 6G7. When the signal voltage varies, the ratio between voltage drops in resistor R_{43} and the potentiometer (consisting of the resistors R_{44} , R_{45} , R_{46}) is changed because of voltage variations on the control grid.

The left diode of 6G7 lets current pass only when the voltage difference between diode and cathode is positive. At this moment current will begin to flow through the diode and the AVC voltage is developed across resistor R_{42} . This voltage is applied through resistor R_{41} to the control grids of the tubes to be regulated.

Voltage in the left diode becomes positive only when the signal voltage exceeds a definite value which corresponds with the commencement of AVC operation.

The voltage required for automatic volume control in this circuit is considerably greater than for delayed AVC. This ensures great stability in the sound level when shifting from distant to local stations.

The Belarus' is fitted with push buttons for fixed tuning. Fixed tuning permits reception of previously selected stations, two on long-wave and four on medium-wave bands. Each of the fixed tuning buttons has a ring on it, which can be turned to tune the set easily to any station within the given band.

In operating with fixed tuning, the oscillator is reconnected to a tuned circuit with capacitive feed-back. The receiver input is reconnected to a single-tuned circuit system: coupling with the antenna, through a divider consisting of capacitors C_{95} -- C_{96} , is changed to capacitive. When any of the tuning buttons is pressed, a tuned input circuit is formed from one of the coils L_{18} - L_{43} , capacitor C_{95} , and the antenna coupling circuit consisting of capacitor C_{96} and choke coil Dr_1 connected in parallel.

Technical Parameters of the Belarus' Receiver

Power consumed: 180 w.

Rated output, with nonlinear distortion factor of 5%: 4 w.

Sensitivity for all bands: not less than 50 uv (for 0.1 rated power).

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Sensitivity from pick-up jack (at frequency of 400 cps and rated output power): 0.2 v.

Accuracy of dial calibration by bands:

- a. Long and medium wave: $\pm 2\%$.
- b. Short wave: $\pm 0.5\%$.

Frequency drift of oscillator in 10 min after preliminary warm-up for 5 min:

- a. For long and medium waves: 1 kc.
- b. For short waves: 2-4 kc.

Pass band for the whole set (from the antenna): 80--6,000 cps with a variation of ± 8 db.

Image-channel selectivity:

- a. For long and medium waves: 50 db.
- b. For short waves: 26 db.

A 10-w dynamic loud-speaker is used in the receiver. Diameter of cone: 300 mm. Resistance of voice coil: 12 ohms.

Appearance and Structural Data

The receiver is mounted in a wooden cabinet, 690 x 305 x 455 mm, which is finished in polished walnut veneer. On the front panel is a rectangular vertical dial, silk-covered loud-speaker, control buttons and knobs, and the tuning indicator.

The dial needle is attached to a movable carriage to which the pilot lights are attached. Three double control knobs are arranged in the following order: inner left knob, volume control; outer left, high af control; inner central, low af control; outer central, i-f pass-band control; inner right, band switch; and outer right, continuous tuning.

The input and oscillatory circuits, together with the switching unit, are mounted as a block on a bakelite panel fastened under the chassis.

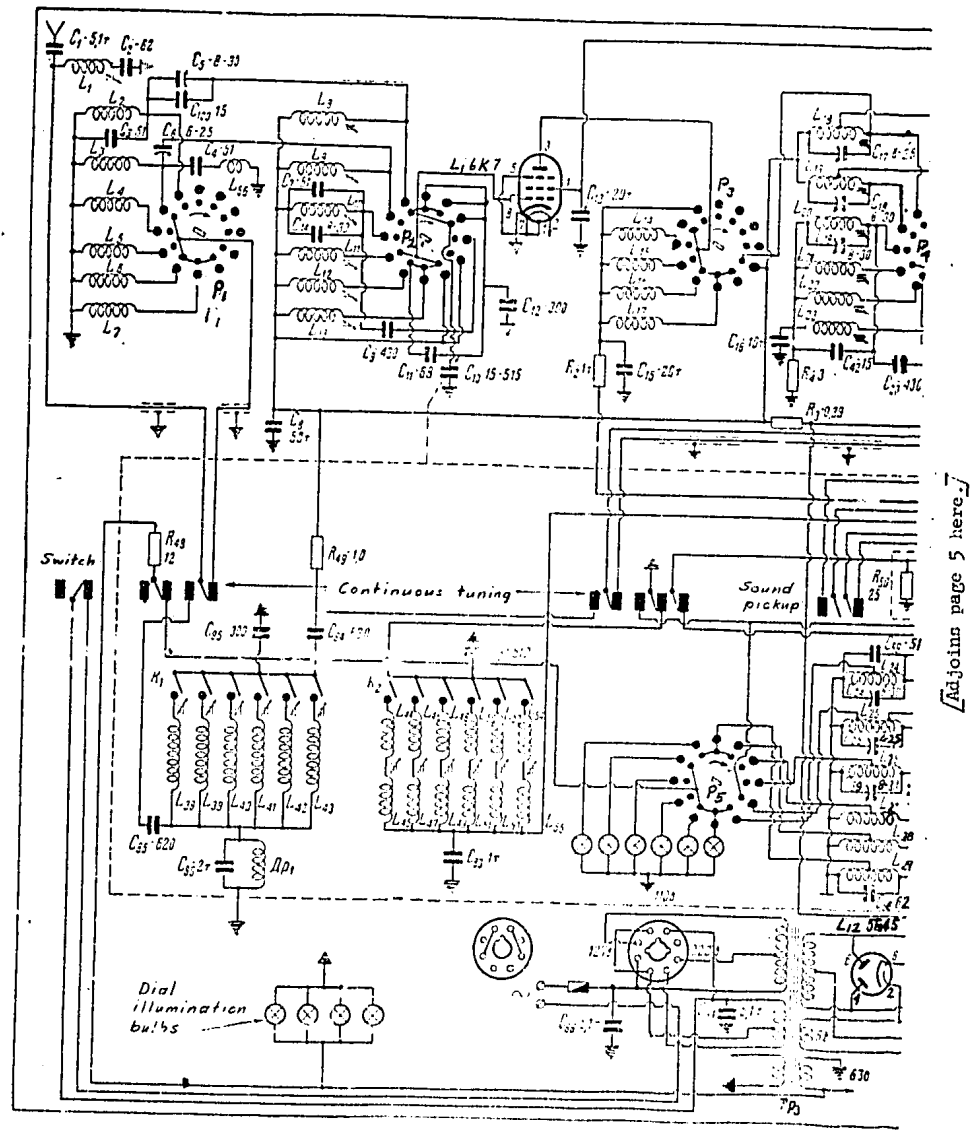
Mounted on the chassis are: the variable capacitor unit, i-f transformers, interstage transformer, and power transformer. The push-button unit is attached flexibly to the top of the chassis and then screwed to the front panel of the cabinet.

The jacks for connecting the antenna, ground pickup, and second speaker are arranged on the rear of the chassis, as well as the line switch and fuse.

To facilitate repairs, the bottom of the cabinet is removable.

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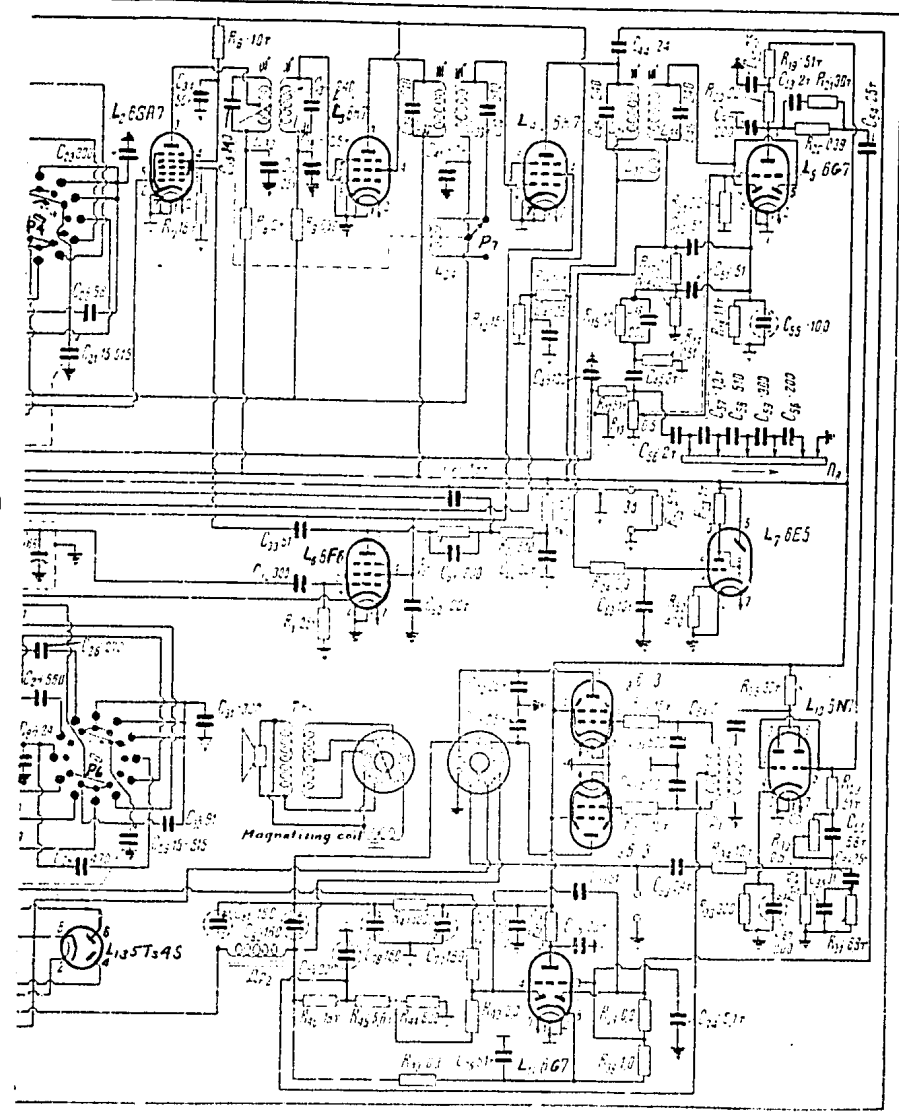
Figure 1. Schematic Diagram of the Belarus' Receiver



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